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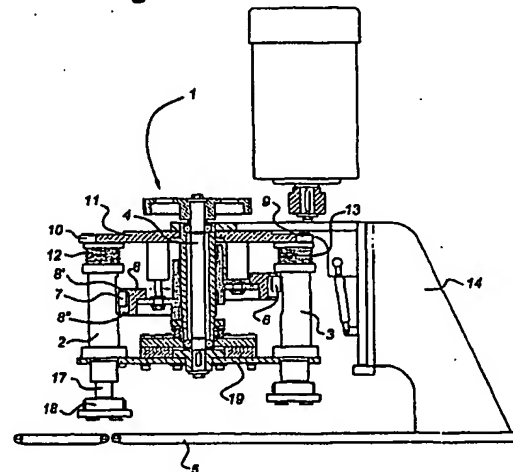
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(54) Rotable pick-up device

(57) The invention relates to a rotatable gripper device (1) for picking up and rotating products which are supplied on a conveyor belt. The device according to the invention comprises a gripper head (2, 3) which can rotate about a vertical central shaft (4) and has a gripping member (18) which can rotate about its axis. For upward and downward movement, the device comprises a first cam roller (6, 7) and cam discs (8), and for rotation about the axis comprises a second cam roller (9, 10) and cam disc (11). The device according to the invention is of a simple and relatively lightweight design, so that it is suitable for operating at high speeds. The gripper device according to the invention can be used to accurately set the rotational path of the gripping member (18) at the gripping position and the release position, by means of the shape of the cam disc, in order to produce a gradual transfer. A large number of rotational patterns can be obtained by rotation of the gripper heads along a vacuum distributor plate with two or more vacuum ports.

Fig 1



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spring. As a result of the spring force, the second cam wheel bears closely against the running surface of the second cam disc, and the gripper head is quickly and accurately restored to its starting position. The torsion spring provides a simple and compact drive for the gripping member about the axis of the gripper head.

[0007] In a further embodiment of a gripper device according to the present invention, the first cam disc comprises two separate running surfaces, between which the cam rollers for a downward and upward displacement, respectively, of the gripper head are accommodated. By allowing the vertical displacement of the gripper head to take place via the running surfaces of the first cam disc, it is possible for the cam rollers to be accommodated in a tight-fitting manner without the load which they exert increasing excessively, as is the case if the cam roller for the vertical displacement is pressed against the cam disc under spring load.

[0008] In a further embodiment of a gripper device according to the invention, a plurality of gripper heads are attached to a support which can rotate about the central shaft, which support is suspended from a vertical arm which is supported on a base. The gripper device can be placed above any desired conveyor belt. Also, the gripper device can easily be displaced with respect to the conveyor belt, for example in order to replace the cam disc.

[0009] The gripper heads can be activated in succession by means of a vacuum port, so that different turning patterns are obtained.

[0010] One embodiment of a gripper head according to the invention will be explained in more detail with reference to the appended drawing, in which:

Fig. 1 shows a side view, in cross section, of a gripper device according to the present invention,  
Fig. 2 shows a longitudinal section through a gripper head according to the present invention,  
Fig. 3 shows a plan view of a vacuum distributor plate,  
Figs. 4a-4f diagrammatically depict various product displacement patterns, according to the way in which the gripper heads are activated, and  
Fig. 5 shows the pneumatic circuit diagram of the gripper heads.

[0011] Fig. 1 shows a gripper device 1 provided with gripper heads 2, 3 which are positioned above a conveyor belt 5. The gripper heads 2, 3 can rotate about a central shaft 4 and are suspended from a common support 19 which is driven by an electric motor 44 via toothed disc 42 and toothed belt 43. The support 19 is attached to a vertical column 14. In the event of rotation about the central shaft 4, the first cam wheels 6, 7 roll along running surfaces 8', 8" of a first cam disc 8, so that the height of the gripper heads above the conveyor belt 5 is varied between a lowered, gripping position and a raised, conveying position. Second cam wheels 9, 10

rotate along a second cam disc 12, so that the angular position of a suction member 18 of the gripper heads 2, 3 is varied through rotation of a support shaft 17, which is connected to the cam wheels 9, 10, about its axis. The cam wheels 9, 10 are clamped against the cam disc 11 by torsion springs 12, 13, which torsion springs exert a restoring force which is directed about the axis of the respective gripper head.

[0012] The gripper heads 1, 3 can be displaced vertically together via cylinders 40, 41.

[0013] Fig. 2 shows a longitudinal section through the gripper head 3 with an external support bush 15 and an internal sliding bush 16 which can slide to and fro vertically inside the bush 15 and can rotate about its axis with respect to the external bush. A support shaft 17, a first end of which is connected to the torsion spring 13 and the second end of which bears the vacuum suction member 18, is accommodated rotatably inside the sliding bush 16.

[0014] Fig. 3 shows a support 20 with six gripper heads 21, 21', which are each connected via a vacuum line 22, 22' to a port A and to vacuum ports B, C, D or E of a stationary distributor plate 23. The vacuum ports B-E are in communication with a vacuum source and can be activated separately. The port A is connected to an excess pressure source in order to rapidly eliminate the vacuum on the suction member and to release the products quickly when they have reached their desired orientation.

[0015] If none of the ports A, B, C, D and E are under a vacuum, no products are picked up and products supplied along a conveying direction T1 will be passed through without being reoriented, as shown in Fig. 4a.

[0016] If only port E is activated, so that this port is connected to a vacuum source, the grippers 21, 21' will pick up and rotate every second product, so that the alternating product orientation shown in Fig. 4b is obtained.

[0017] If ports C and E are activated, all the products are lifted and rotated, so that the product orientation shown in Fig. 4c is obtained.

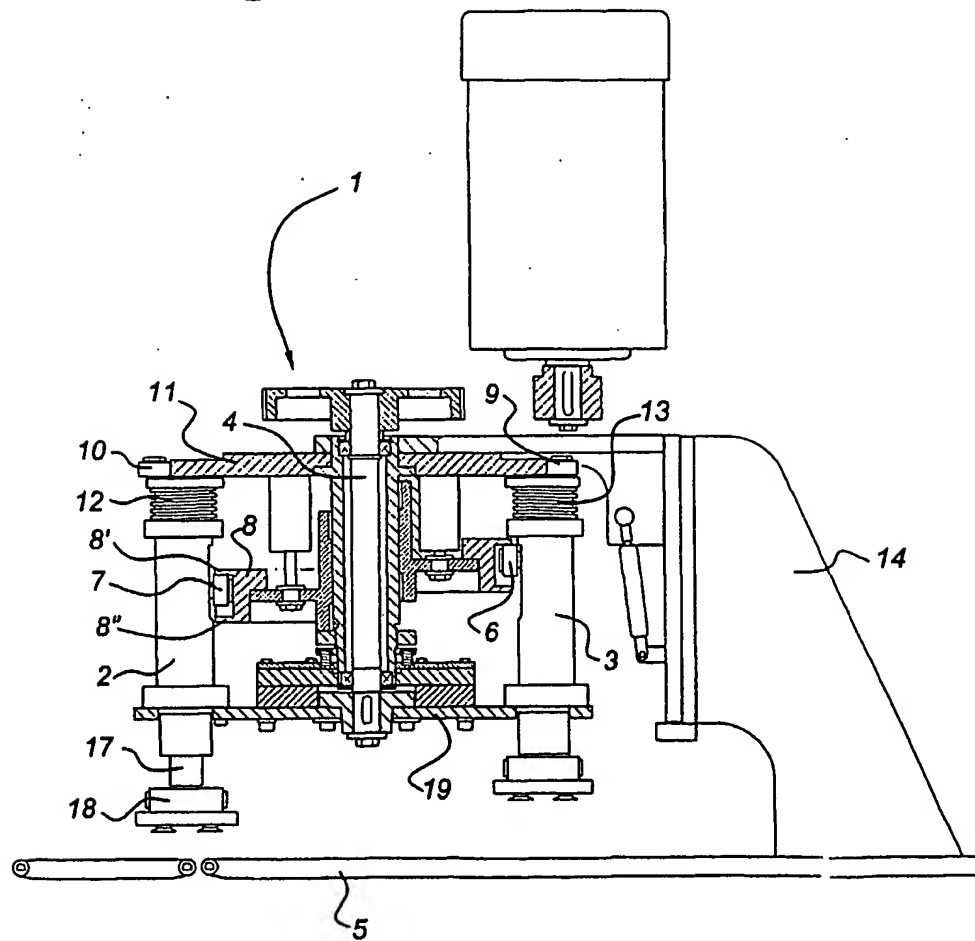
[0018] If ports C, D and E are activated, all the products will be lifted, and half the products will be turned and passed on in the conveying direction T1, while the other half of the products will be turned and passed on in the conveying direction T2. This is shown in Fig. 4d.

[0019] If ports D and E are activated, half the products are not lifted and are allowed to pass through in the conveying direction T1, while the other half are lifted and rotated, then delivered in the conveying direction T2. This is shown in Fig. 4e.

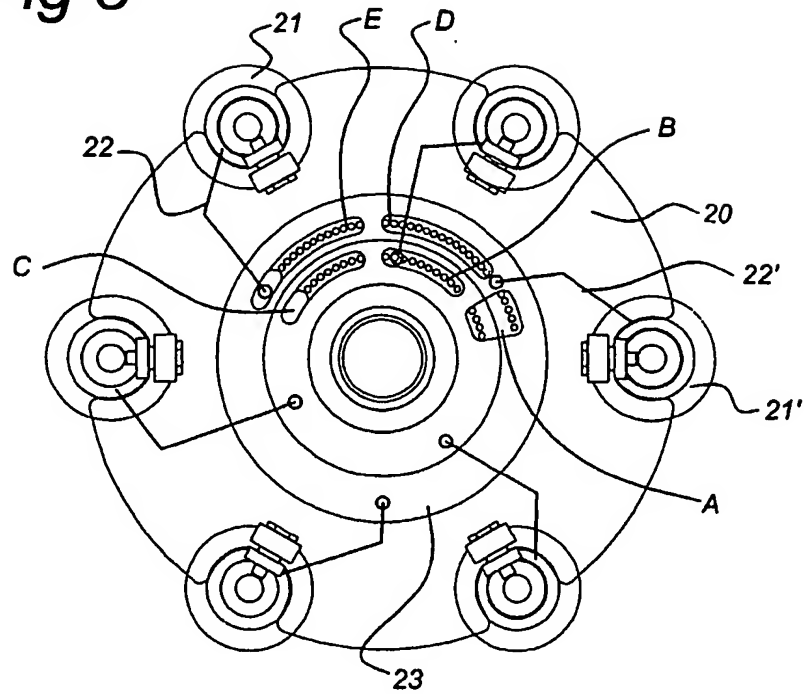
[0020] If ports B, C, D and E are activated, all the products are lifted and rotated before being passed on in the conveying direction T2. This is shown in Fig. 4f.

[0021] As shown in Fig. 5, port A of the gripper device is connected to vacuum source 30 via a line 31, via respective mechanically actuatable, spring-loaded 3/2

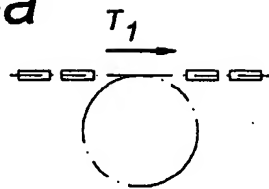
Fig 1



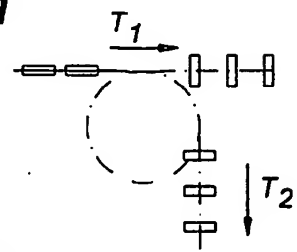
**Fig 3**



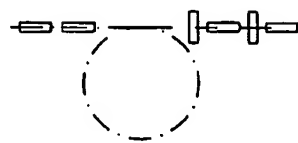
**Fig 4a**



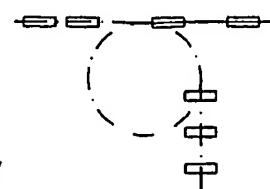
**Fig 4d**



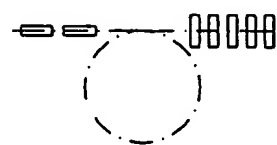
**Fig 4b**



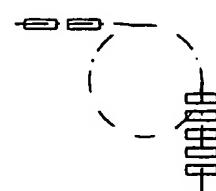
**Fig 4e**



**Fig 4c**



**Fig 4f**





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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 20 1571

| DOCUMENTS CONSIDERED TO BE RELEVANT   |   |                                  |  |
|---|---|----------------------------------|--|
| Category  | Citation of document with indication, where appropriate, of relevant passages   | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (Int.CI.7) |
| X   | DE 25 51 538 A (KARLSRUHE AUGSBURG IWEKA)<br>26 May 1977 (1977-05-26)<br>* page 8, paragraph 1; figures 1,2 *<br>* page 11, paragraph 2; figure 3 * | 1,2,5                            | B65G47/91                                    |
| A   | US 4 558 555 A (RUEFF HERBERT ET AL)<br>17 December 1985 (1985-12-17)<br>* column 4, line 38 - line 53 *  | 1,3-5                            |  |
| A   | DE 196 05 265 A (GD SPA)<br>22 August 1996 (1996-08-22)<br>* column 2, line 47 - line 56 *<br>* column 3, line 3 - line 11; figure 3 *              | 1,3,4                            |  |
| The present search report has been drawn up for all claims  |   |                                  | TECHNICAL FIELDS SEARCHED (Int.CI.7)         |
|   |   |                                  | B65G   |
| Place of search   |   | Date of completion of the search | Examiner                                     |
| THE HAGUE   |   | 8 August 2000                    | Beernaert, J                                 |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons</p> <p>8 : member of the same patent family, corresponding document</p> |   |                                  |  |

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